

IN THE CLAIMS:

CLAIMS 1-4, 6,7, 11, 12, 14, 18, 19, 21, 22, and 32-44(CANCELLED).

CLAIM 1(WITHDRAWN). A polishing pad for use in chemical mechanical polishing of substrates, said polishing pad having a polishing surface, comprising:

a paper-making wet-laid process fibrous matrix consisting of cellulosic fibers;

a binder for binding said fibrous matrix, said binder consisting of thermoset resin ;

said fibrous matrix and said binder forming a porous structure by which polishing slurry and polishing debris during chemical mechanical polishing of substrates are temporarily stored for subsequent rinsing away, and for enhanced flow-distribution of the polishing slurry.

CLAIM 2(WITHDRAWN). The polishing pad according to claim 1, said polishing pad being used in chemical mechanical polishing of substrates, wherein said thermoset resin consists of phenolic resin for binding said cellulosic fibers.

CLAIM 3(WITHDRAWN). The polishing pad according to claim 1, said polishing pad being used in chemical mechanical polishing of substrates, wherein said fibrous matrix consists of at least one of: cellulose fibers, lyocell and "ARAMID" , and said thermoset resin consists of at least one of the following: Phenolic resin, epoxy, silicone, for binding said fibers.

CLAIM 4(WITHDRAWN). The polishing pad for use in chemical mechanical polishing of substrates according to claim 1, wherein said cellulosic fibers are chosen from the group consisting of: Cotton linters and wood pulp.

CLAIM 5(CANCELLED).

CLAIM 6(WITHDRAWN). The polishing pad for use in chemical mechanical polishing of substrates according to claim 3, wherein said fibers of said fibrous matrix are fortified with latex.

CLAIM 7(WITHDRAWN). The polishing pad according to claim 1, wherein said fibers of said fibrous matrix are fortified with latex.

CLAIM 8(CANCELLED).

CLAIM 9(CANCELLED).

CLAIM 10(CANCELLED).

CLAIM 11(WITHDRAWN). The polishing pad for use in chemical mechanical polishing of substrates according to claim 1, claim 3 or claim 4, wherein said polishing surface further comprises groove means for optimal distribution of polishing slurry during chemical mechanical polishing of substrates.

CLAIM 12(WITHDRAWN). The polishing pad for use in chemical mechanical polishing of substrates according to claim 11, wherein said groove means for optimal distribution of polishing slurry during chemical mechanical polishing of substrates comprises an arc-radial groove pattern.

CLAIM 13(CANCELLED).

CLAIM 14(WITHDRAWN). The polishing pad for use in chemical mechanical polishing of substrates according to claim 3, wherein said fibrous matrix is comprised of fibers having cross-sectional diameters of between 10 and 50 microns, and a length in the range of between .4 and 1.3mm.

CLAIM 15(CANCELLED).

CLAIM 16(CANCELLED).

CLAIM 17(CANCELLED).

CLAIM 18(WITHDRAWN). A method of making a fiber matrix used as a medium for subsequent resin impregnation, for use in making polishing pads for use in chemical-mechanical process apparatuses for the chemical-mechanical polishing of substrates, comprising: making said fiber matrix by a paper-making wet-laid process comprising the following steps:

- (a) dispersing paper-making cellulosic fibers in water to form a paper-making slurry;
- (b) delivering the paper-making slurry of said step (a) to a paper-making machine and making a paper sheet in said paper-making machine;

(c) said step (b) comprising draining water from the slurry to form a continuous paper sheet;

(d) drying the wet-laid continuous paper sheet of said step (c) for creating a relatively soft, compliant fiber matrix from which polishing pads for use in chemical mechanical polishing of substrates are formed.

CLAIM 19(WITHDRAWN). The method according to claim 18, wherein said steps (b) through (d) are performed by at least one of the following: a handsheet mold, a fourdrinier machine, an incline wire machinery, roto-former machine, twin wire machine.

CLAIM 20(CANCELLED).

CLAIM 21(WITHDRAWN). The method according to claim 18, wherein said step (a) also comprises dispersing a latex binder, or equivalent thereof, in the water to form a slurry of fibers and binder.

CLAIM 22(WITHDRAWN). The method according to claim 19, further comprising, before said step (d), applying a latex binder, or equivalent thereof, to the fiber surfaces.

CLAIM 23(PREVIOUSLY PRESENTED) A method of forming a polishing pad for use in chemical mechanical polishing of substrates, comprising:

(a) forming a fiber matrix sheet made of paper-making fibers on a paper-making machine;

(b) impregnating the fiber matrix sheet with a binder material;

(c) curing the binder material with heat to form a fiber matrix sheet that is relatively soft and compliant;

(d) said step (b) comprising binding the fiber matrix with a thermoset resin.

CLAIM 24(PREVIOUSLY PRESENTED). The method according to claim 23, wherein said step (d) comprises using a binder from at least one of the following: phenolic, epoxy, silicone, and modified phenolics, wherein said step (b) is done by soaking the fiber matrix sheet in a bath of liquid resin.

CLAIM 25(ORIGINAL). The method according to claim 23, wherein said step (d) comprises exposing the fiber matrix to curtains of liquid resin, or spraying liquid resin onto the fiber matrix.

CLAIM 26(ORIGINAL). The method according to claim 23, further comprising densifying the resin impregnated matrix.

CLAIM 27(PREVIOUSLY PRESENTED). The method according to claim 23, further comprising forming a grooved-surface pattern in the surface of the fiber matrix sheet.

CLAIM 28(PREVIOUSLY PRESENTED). The method according to claim 27, wherein said step of forming a grooved -surface pattern is performed after the thermoset resin is fully cured.

CLAIM 29(PREVIOUSLY PRESENTED). The method according to claim 28, wherein said step of forming a grooved-surface pattern comprises embossing the grooved-surface pattern

CLAIM 30(ORIGINAL). The method according to claim 23, further comprising after said step (d), grinding the surface of resin-fiber matrix for obtaining desired surface characteristics.

CLAIM 31(ORIGINAL). The method according to claim 30, wherein said step of grinding comprises forming surface asperities in the surface of the resin-fiber matrix.

CLAIM 32(WITHDRAWN). In a chemical mechanical polishing apparatus for the polishing of substrates, which apparatus comprises a rotating platen, a polishing pad, having a polishing

surface, attached to said rotating platen, an upper rotating member for retaining a wafer carrier for a wafer substrate, slurry means for introducing slurry onto the polishing pad , the improvement comprising:

said polishing pad being of a porous structure and comprising a fibrous matrix consisting of paper-making fibers, said fibrous matrix consisting of a paper-machine produced paper sheet bound with a thermoset resin material; said polishing pad comprising voids in which said polishing slurry flows during chemical mechanical polishing of substrates and in which debris formed during the chemical mechanical polishing of substrates are temporarily stored.

CLAIM 33(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said fibrous matrix consists of at least one of: cellulose fibers and “ARAMID”, and said thermoset resin material consists of at least one of the following: Phenolic resin, epoxy, silicone, for binding said fibers.

CLAIM 34(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said polishing surface comprises a ground surface in order that said fibrous matrix thereat is of open construction so that polishing slurry may be readily absorbed and optimally distributed during chemical mechanical polishing of substrates.

CLAIM 35(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said fibers of said fibrous matrix are fortified with latex.

CLAIM 36(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 34, wherein said ground polishing surface consists of surface asperities for optimizing the distribution of said polishing slurry during chemical mechanical polishing of substrates.

CLAIM 37(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 36, wherein said surface asperities are at least 10 microns in depth, width and/or length.

CLAIM 38(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said polishing surface comprises a groove-pattern having grooves for optimizing the distribution of said slurry during chemical mechanical polishing of substrates.

CLAIM 39(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 38, wherein said groove-pattern comprises an arc-radial groove pattern.

CLAIM 40(WITHDRAWN). The chemical mechanical polishing apparatus for the polishing of substrates according to claim 32, wherein said fibrous matrix is comprised of fibers having cross-sectional diameters of between 10 and 50 microns, and a length in the range of between .4 and 1.3mm, said fibrous matrix making up between 30-80%, by weight, of said polishing pad.

CLAIM 41(WITHDRAWN). The method according to claim 18, wherein said step (a) further comprises adding thermoset resin material in addition to said paper-making cellulosic fibers and water to form said a paper-making slurry;

said method further comprising:

(e) curing said continuous paper sheet after said step (d).

CLAIM 42(WITHDRAWN). The method according to claim 18, wherein said step (a) further comprises adding thermoset resin material in addition to said paper-making cellulosic fibers and water to form said a paper-making slurry;

said method further comprising:

(e) cutting said continuous paper sheet after said step (d) into pad-sized blanks;

(f) curing said pad-sized blanks after said step (e).

CLAIM 43(WITHDRAWN). The method according to claim 18, wherein said method further comprises:

(e) impregnating said continuous paper sheet with thermoset resin; and

(g) curing said continuous paper sheet after said step (e).

CLAIM 44(WITHDRAWN). The method according to claim 43, further comprising:

cutting said continuous paper sheet after said step (f) into CMP polishing pads.

CLAIM 45(CURRENTLY AMENDED). A process of making polishing pads for use in chemical mechanical polishing of substrates, each said polishing pad having a ground polishing surface and consisting of a porous fibrous matrix of paper-making fibers, fillers, and a binder for

binding said fibrous matrix, said binder consisting of thermoset resin, said matrix and said binder forming a porous structure by which polishing slurry or polishing debris during chemical mechanical polishing of substrates are temporarily stored for subsequent rinsing away and for enhanced flow-distribution of the polishing slurry; said ground polishing surface consisting of a ground surface in order that said matrix thereat is of open-pore construction and defines surface asperities by which said optimal distribution of polishing slurry during chemical mechanical polishing of substrates is achieved, so that polishing slurry may be readily absorbed and optimally distributed during chemical mechanical polishing of substrates, said polishing pads being made by a process comprising:

- (a) making said polishing pads using a wet-laid paper-making process;
- (b) said step (a) comprising forming a slurry of at least water, paper-making fibers, and latex;
- (c) mixing said slurry of said step (b) in order to disperse the fibers;
- (d) delivering said mixed slurry to a paper-making apparatus, and forming a wet-laid sheet;
- (e) drying the wet-laid sheet of said step (d);
- (f) adding thermoset resin binder;
- (g) said step (f) comprising at least one of: adding the thermoset resin during said step (b), and after said step (e);
- (h) curing the sheet;
- (i) cutting the sheet to form polishing pads of desired size;
- (j) grinding at least one surface face of each said polishing pad to form said asperities and to open the porous matrix for polishing slurry transport during CMP processes.

Add the following new claims.

CLAIM 46(NEW). The method according to claim 23, wherein said step (a) comprises:

- (e) dispersing paper-making cellulosic fibers in water to form a paper-making slurry;
- (f) delivering the paper-making slurry of said step (e) to a paper-making machine and making a paper sheet in said paper-making machine;
- (g) said step (f) comprising draining water from the slurry to form a continuous paper sheet;
- (h) drying the wet-laid continuous paper sheet of said step (g) for creating a relatively soft, compliant fiber matrix from which polishing pads for use in chemical mechanical polishing of substrates are formed.

CLAIM 47(NEW). The method according to claim 46, wherein said steps (f) through (h) are performed by at least one of the following: a handsheet mold, a fourdrinier machine, an incline wire machinery, roto-former machine, twin wire machine.

CLAIM 48(NEW). The method according to claim 46, wherein said step (e) also comprises dispersing a latex binder, or equivalent thereof, in the water to form a slurry of fibers and binder.

CLAIM 49(NEW). The method according to claim 46, further comprising, before said step (h), applying a latex binder, or equivalent thereof, to the fiber surfaces.

CLAIM 50(NEW). The method according to claim 46, wherein said step (e) further comprises adding thermoset resin material in addition to said paper-making cellulosic fibers and water to form said a paper-making slurry;

said method further comprising curing said continuous paper sheet after said step (h).

CLAIM 51(NEW). The method according to claim 46, wherein said step (e) further comprises adding thermoset resin material in addition to said paper-making cellulosic fibers and water to form said a paper-making slurry;

said method further comprising cutting said continuous paper sheet after said step (h) into pad-sized blanks, and curing said pad-sized blanks.

CLAIM 52(NEW). The method according to claim 46, wherein said method further comprises:

(i) impregnating said continuous paper sheet with thermoset resin; and

(j) curing said continuous paper sheet after said step (i).

CLAIM 53(NEW). The method according to claim 52, further comprising:

cutting said continuous paper sheet after said step (j) into CMP polishing pads.